Retailers' Use of Shipping Cost Strategies: Free Shipping or Partitioned Prices?

Tanja Frischmann, Oliver Hinz, and Bernd Skiera

ABSTRACT: The Internet has radically reduced the cost of collecting and distributing information. Consequently, researchers initially predicted that the resulting price transparency would drive prices toward a single market price. However, this has largely not happened, partly because retailers use shipping costs to make prices less comparable. Using data on 517,048 offers of 895 retailers from a leading European price comparison site, we show that retailers pursue two different shipping cost strategies. Both strategies lead to higher gross product prices, which are the sum of net product price and shipping costs and thus try to capture consumer surplus. These strategies are conflicting, however, and target different consumer segments: Some retailers charge high shipping costs and thereby try to exploit consumers' biased perceptions of partitioned prices, while other retailers offer "free shipping" to attract consumers and exploit their so-called zero-risk bias. Consumers realize the lowest gross product prices by ordering at retailers that charge moderate shipping costs.

KEY WORDS AND PHRASES: Electronic commerce, e-tail, price comparison, pricing, shipping costs.

By radically reducing the marginal costs of collecting and distributing information, the Internet was expected to result in price transparency that would eventually lead to a market with a single price [12]. In addition, researchers predicted an increasing competition because of reduced search costs [5] and improved consumer access to information, leading to lower prices in the online market. Evidence supporting the notion of lower online prices is provided by Bertin and Wathieu [11] and Zettelmeyer, Morton, and Silva-Risso [51], among others. However, although the Internet has matured, price dispersion remains substantial in online markets (e.g., [2, 15, 38, 41]). Despite the fact that price comparison sites should simplify the identification of lowest prices, prices listed on these sites still exhibit a large degree of dispersion [39], which seems to be a persistent phenomenon across categories and over time [38].

Several reasons may explain the absence of this expected price transparency. First, consumers exhibit less-than-optimal information-gathering and search behavior [29], which suggests that the possibilities provided by the Internet do not help consumers make better decisions. The likely reasons for the suboptimal search behavior are that online search is more costly than expected ([47]; see also [39]) and consumers' decisions still remain prone to errors [46]. Furthermore, price comparison sites—which generate revenues from retailers via fees for listing, product placements, rankings, or commissions on referred sales—might not be interested in promoting a "perfect" price comparison, as that might drive away retailers. Also, retailers might have developed suitable strategies to prevent the total annihilation of information asymmetry [27,

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45]. For example, retailers offer products in bundles to better differentiate their offering from competitive offers, a common tactic in highly competitive product categories [49]. Furthermore, e-commerce technologies have reduced retailers' cost of collecting information about consumers' preferences as well as for managing multiple product prices. These technologies, combined with advanced manufacturing technologies, allow retailers to offer customized products at discriminatory prices [17]. Moreover, the technical opportunities allow retailers to easily apply new pricing strategies that are characterized by their dynamic character, which can be implemented in various dimensions [31]. In addition, retailers benefit from several other factors, such as the ability to adjust prices quickly and easily, value-based instead of cost-based pricing (especially for digital goods), lower promotion costs, and higher access to many buyers and sellers [31, 35].

Pricing strategies for online retailers can be classified according to how (1) price reductions are given, (2) prices are set, or (3) prices and offers are presented. Price reductions can include, among other strategies, e-coupons, quantity bundles, and time-related or consumer segment–related prices [31]. Apart from posted prices, new technologies enable stronger consumer participation, and thus the implementation of interactive prices [27]. Examples of such interactive pricing mechanisms are English, Dutch, Vickrey, and reverse auctions [6] as well as name-your-own-price mechanisms [26] and exchanges [31]. The way retailers present prices also influences sales, with possible applications being price bundles and partitioned prices [31, 36]. These pricing strategies can be applied to avoid the development toward a single market price.

Retailers conceal the gross price by using partitioned prices, which means that they divide the price into two components: a large base price and a comparatively small surcharge. Shipping costs are frequently used for partitioned prices, with the retailer splitting the gross product price into a net product price and shipping costs. A major motivation for this practice arises from several laboratory experiments showing how partitioned prices exert a positive influence on consumers' intention to buy [50], lead to lower total recalled costs [36], and exert a positive effect on product evaluations [30]. These findings are supported by the fact that most price comparison sites list the offer with the lowest net product price first (e.g., www.geizkragen.de and www.preissuchmaschine.de), and some price comparison sites refrain altogether from ranking products according to their gross prices (e.g., www.kelkoo.de).

However, consumers are also attracted by free shipping offers. These "attention getter" offers seem to be attractive for consumers [32], and shopping baskets are less likely to be abandoned for such offers [10]. Experiments also show that higher perceived benefits associated with free offers lead to an increase in demand [42].

Hence, partitioned prices, as well as free shipping offers, are likely to lead to situations in which consumers suffer on account of biased perceptions. Retailers might consequently aim to exploit these biased perceptions of shipping costs, either by using partitioned prices that include rather high shipping costs or by offering free shipping (and thus an unpartitioned high gross product price), to attract many consumers. The aim of this paper is to examine whether,

and if so, how, retailers use shipping costs as to achieve higher gross prices. We do so by analyzing gross and net prices alongside shipping costs for more than half a million offers on a price comparison site.

Our results allow for a better understanding of retailers' behavior and may help consumers to choose more favorable online offers. Specifically, we conceptualize the different shipping cost strategies that retailers pursue to exploit consumers' biased perceptions of shipping costs and then test in an empirical study our hypotheses that describe the relationships between shipping costs and product prices. Our work offers three main contributions to the existing literature on shipping costs: (1) We introduce free shipping as a pricing strategy and provide an explanation for the coexistence of two fairly different shipping cost strategies (i.e., free shipping and high shipping costs), (2) we use a unique data set and empirically test for evidence of two shipping cost strategies, and (3) we derive implications for consumers' optimal selection of retailers.

The remainder of this article is organized as follows: First, we review literature that analyzes consumers' biased perceptions of partitioned prices and free shipping, respectively, and develop hypotheses that outline how retailers exploit these biased perceptions. We then introduce the data for our empirical study and the corresponding results. Finally, we discuss the results and conclude our paper with remarks and implications.

Consumers' Biased Perceptions of Shipping Costs

It is well known that consumers sometimes rely on biased perceptions, especially in terms of prices [3, 33]. One such case is the perception of partitioned prices; another is the perception of "free" offers.

Partitioned Prices

According to Morwitz, Greenleaf, and Johnson [36], price partitioning is the act of separating the total price (gross product price) into a base price (net product price) and one or more surcharges. For the purpose of our study, we define the gross product price (GPP) as the sum of the net product price (NPP) and the shipping costs (SC). In the context of this paper we neglect taxes, which are in some parts of the world, such as Europe, typically included in the net product price, and we assume uniform shipping costs for all consumers in a country, as is typically the case in Europe:

$$\text{Gross Product Price (GPP)} = \text{Net Product Price (NPP)} + \text{Shipping Costs (SC)}.$$

Although different partitions of the gross product price into net product price and shipping costs should not change the behavior of a consumer who is mindful, Morwitz, Greenleaf, and Johnson [36] demonstrated experimentally that partitioned pricing can increase demand and elevate profits. In addition, Burman and Biswas [13] and Schindler, Morrin, and Bechwati [40] found that if consumers expend little cognitive effort in comparing prices, demand can

increase when the shipping costs are separated from the net product price. One specific heuristic approach that consumers use to process partitioned prices is anchoring and adjustment [48]. Following this strategy, consumers are likely to anchor the base price (net product price) and then adjust insufficiently upward to incorporate the surcharge (i.e., shipping costs) [48].

Xia and Monroe [50] also found that partitioned prices enhance consumers' purchase intentions, price satisfaction, and perceptions of product value, so that retailers have the opportunity to increase their gross product price. Xia and Monroe noted that retailers can positively influence consumers by displaying the shipping costs separately because consumers believe that in so doing they obtain more insight into the retailer's cost structure, even if this belief is not accurate in most cases.

Morwitz, Greenleaf, and Johnson [36] concluded that retailers are aware of the fact that partitioned prices prompt lower total recalled costs. This way, consumers' biased perceptions of partitioned prices create opportunities for retailers to capture additional consumer surplus by charging lower net product prices but comparably higher shipping costs.

In addition to these behavioral findings, Daripa and Kapur [18] concluded that many retailers submit only net product prices to a price comparison site, noting that shipping costs do appear on their Web sites. Research by the EuPD [20] confirms these findings and reveals that many online shops only disclose the shipping costs at the end of the purchase process so that they might benefit from the consumers' high lock-in costs. This approach leads also to a better ranking on the list of the price comparison sites than a submission of the gross product price. Consequently, the retailers are likely to realize higher profits through partitioned prices [34].

Shipping costs should disproportionately decrease the net product price (see Figure 1, left) and should also increase the gross product price (see Figure 1, right). The same gross product price would be apparent if a "fair" retailer were to lower the net product price by one dollar for every one dollar increase in shipping costs, as indicated by the dashed line in Figure 1 (left); however, we expect that some retailers may not be "fair" and are thus prepared to observe a disproportionately small negative effect of shipping costs on the net product price.

Brynjolfsson and Smith [12] found that shipping costs have a positive effect on the gross product price of CDs and books, and Ancarani and Shankar [2] confirmed these findings. Baylis and Perloff [9], in their investigation of the market for cameras and scanners, identified a positive effect of shipping costs on the gross product price; at the same time, they recorded an inverted U-shaped influence of shipping costs on gross product price, although they do not explain this unexpected result. Clay et al. [15] also found that lower net product prices of books accompany high shipping costs.

In summary, retailers can benefit from increased gross product prices, and we posit the following hypothesis:

> ***Hypothesis 1:*** *Retailers use a partitioned price strategy to charge higher gross product prices by increasing shipping costs more than they decrease the net product price.*

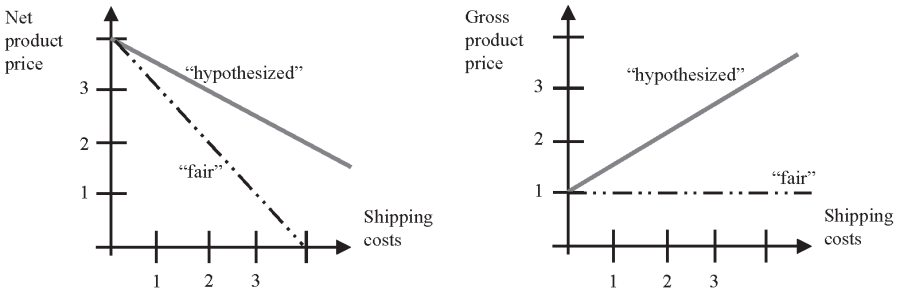

Figure 1. Effect of Shipping Costs on Net Product Price (left) and Gross Product Price (right)

Free Shipping Offers

Another example of a consumer bias is the perception of "free" offers, which has been documented in different environments. Shampanier, Mazar, and Ariely [42] conducted several experiments to investigate the effect of free (zero price) offers and found that, while maintaining the price difference between the goods, the free options are evaluated more positively than other offers. Consumers appear to act as if zero pricing of a product not only decreases its cost but also adds to its benefits; the authors' explanation is that humans are intrinsically afraid of losses. Their results provide support for the affective evaluation idea, namely, that the free offer elicits a more positive affect than would be predicted by the standard cost-benefit analysis (see also [21, 23, 44]). The difference between one cent and zero is perceived as much larger than the difference between two cents and one cent. Psychologists report that people experience more positive affect when they are exposed to a free offer—and this leads to a significant and major increase in demand for the free offer (e.g., [21]). This phenomenon is also called the zero-risk bias and occurs because consumers try to eliminate risk entirely, meaning that there is no chance of harm being caused. This is especially relevant to Internet shopping, which is usually characterized by a degree of uncertainty. According to Schindler, Morrin, and Bechwati [40], a high fraction of consumers are skeptical regarding shipping charges; this segment will prefer shipping costs that are included in the gross price because they experience more displeasure when they have to pay shipping costs separately.

In Figure 1 (right), it appears that consumers can expect the lowest gross product price if the retailer does not charge shipping fees. However, as stated earlier, "free" also has an effect on consumers' evaluation of prices. Given the profitable effect of free shipping reported in various studies, retailers might also exploit the consumers' biased perception of "free" and try to capture consumer surplus. For instance, Keeney [32] showed empirically that free shipping offers increase the quantity of consumers' orders. Additionally, several studies have confirmed that a retailer can effectively attract prospective buyers with free shipping offers [19, 50] and then successfully convert them to consumers [32]. Bayles [8] analyzed consumers' shopping attitudes toward

free shipping offers and determined that this strategy is useful for enticing buyers to return to Web sites.

From a retailer's perspective, free shipping offers extra benefits. For example, Bertin and Wathieu [10] argued that free shipping offers help to reduce the abandoned-basket effect, which means that more consumers refrain from dropping out of the shopping process.

Given these findings, a promising strategy for retailers would be to attract prospective consumers with free shipping offers and simultaneously increase the net (gross) product price more than proportionately. As a result, products with free shipping should be more expensive than the ones with moderate shipping costs.

Following this line of reasoning, it may be beneficial for the retailer to refrain from charging shipping costs, instead promoting free shipping but simultaneously increasing the net product price to overcompensate for the absent shipping costs. Accordingly, we propose our second hypothesis:

> ***Hypothesis 2:*** *Retailers who offer free shipping will charge higher gross prices than retailers with moderate shipping costs.*

H1 and H2 seem contradictory, but the free shipping and partitioned prices strategies serve different segments in the market. The partitioned prices strategy addresses prospective buyers who either expend little cognitive effort in comparing prices [13, 40] or who tend to evaluate the perceived benefit of shipping more highly than others [25]. Consumers who evaluate shipping as less important prefer free shipping offers [25], as do risk-averse consumers, for example, inexperienced consumers in contrast to more experienced consumers [32].

Control Variables

We add a number of control variables to our conceptual model that might produce an impact on prices. We control for "hot items," or items that are offered by a high number of retailers but the huge demand for which frequently leads to out-of-stock situations. On the one hand, fierce competition on hot items can drive down prices (e.g., [14]). On the other hand, Dewan, Freimer, and Jiang [16] found that a retailer who can still deliver the item can benefit from the temporary monopoly by taking advantage of the information transparency on the Internet. Thus, this retailer might charge higher prices if competitors are out of stock.

Another important factor for a buyer–seller relationship is trust. Studies have shown that trust acts as an antecedent for price premiums, which are defined as prices that yield above-average profits [43]. In the context of e-commerce transactions, price premiums are defined as the monetary amount above the average price for a certain product [4]. Consumers in an efficient market with dynamic pricing are willing to compensate reputable sellers with price premiums to ensure safe transactions [4]. Vice versa, buyers will penalize sellers of questionable reputation with a price discount because buyers must assume above-average transaction-specific risks [4].

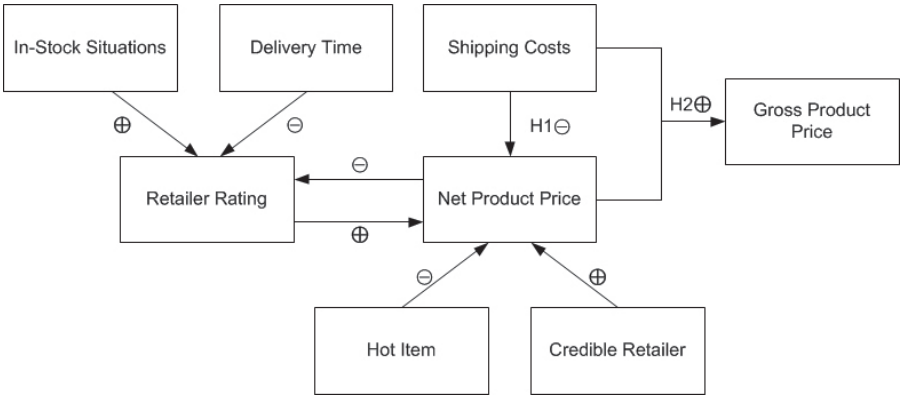

Figure 2. Conceptual Framework

We measure reputation in two ways: First, prospective buyers will evaluate a retailer as a credible partner for transactions if it has successfully completed a sufficient number of transactions. Second, studies have shown that retailers with a higher rating captured by a reputation system can realize price premiums [4].

While the retailer rating can have an impact on prices, prices can also have an impact on retailer rating, which introduces some endogeneity to our model. The reason given for this phenomenon is that lower prices will lead to a higher consumer surplus if the transaction is completed and higher consumer surplus will increase customer satisfaction [27], which will in turn lead to more positive word of mouth and better retailer ratings (e.g., [37]).

Besides price, we expect that delivery time and out-of-stock situations affect the retailer rating negatively (see, e.g., [30]), since the most frequent complaint among mail-order customers involves out-of-stock situations [22].

Figure 2 depicts our conceptual framework, which summarizes the proposed hypotheses and the control variables.

Empirical Study

Setup of Empirical Study

To test our hypotheses, we collected data from a leading European price comparison site that covers prices in Germany, the largest economy in Europe. We were able to observe the behavior of 895 retailers, allowing us to infer the chosen shipping cost strategies. Our data from Europe privileges us to rule out alternative explanations that might exist in other markets: In contrast to the U.S. market, for example, retailers in Europe must refund shipping costs if consumers return their products. Thus, shipping costs in Europe do not influence consumers' decisions regarding product returns. Moreover, retailers will charge uniform shipping costs regardless of the shipping distance as long as the consumer lives in the same country. In addition, our data set has the advantage, relative to data from a U.S. price comparison site, that the

tax component of a firm's price is identical for all German consumers shopping at the price comparison site regardless of where they are domiciled in Germany [7].

Data Set

Data Description

We focus on three popular categories from which we draw a random sample of 16,199 different products. For these 16,199 products, we have a total of 517,048 offers in our data set. The data set, from a leading European price comparison site, includes the following product categories: computer accessories, consumer goods, and software. The products appear hierarchically in the following structure (from top to bottom): product category → product group → product class → product (e.g., for a digital camera, the listing might read "consumer goods") → cameras and photos → digital cameras → Canon EOS XTI. The average number of offers per product is 31.92. Therefore, a consumer looking for a Canon EOS XTI finds approximately 32 different offers on the price comparison site, in addition to any potential bundles or product variations, which we do not consider in our empirical study. We standardize the gross product price for all offers, dividing it by the average gross product price for this product so that we can calculate the average price variance for the entire data set. On average, the standardized price variance per product class is 4.57 percent of the average gross product price, which seems reasonable. The price comparison site orders the results ascending by their net price, which also includes the costs for the cheapest payment option.

The data set also covers retailer ratings, where higher retailer ratings indicate better perceived quality from the consumers' point of view. The price comparison site presents the average rating with 0–5 stars in 0.5 intervals (similar to Amazon.com's product evaluations). The price comparison site also quotes the number of evaluations that are aggregated in this retailer rating. The correlation between the average retailer rating and the average shipping cost of the retailer is insignificant ($r = –0.022$, $p > 0.7$).

Almost 33 percent of all offers exhibit shipping costs that are lower than €7.01, and 53.7 percent are lower than €10.01. Free shipping offers appear in 5.9 percent of all offers in our data set, and the minimum nonzero shipping cost is €1.00. The average shipping costs, however, differ across product categories and products.

Across all retailers, 81.7 percent separate shipping costs, and 6.9 percent exclusively offer free shipping. Regarding the product characteristics, we find that for 65.73 percent of the 517,048 total offers the product has to be replenished (i.e., is out of stock) and cannot be delivered in the next 24 hours.

Figure 3 shows the distribution of shipping costs across product categories. The values of these shipping costs provide face validity and fall within the expected range. Furthermore, we observe differences in the distribution of shipping costs, confirming that in some product categories, such as computer accessories and consumer goods, retailers offer free shipping, even though

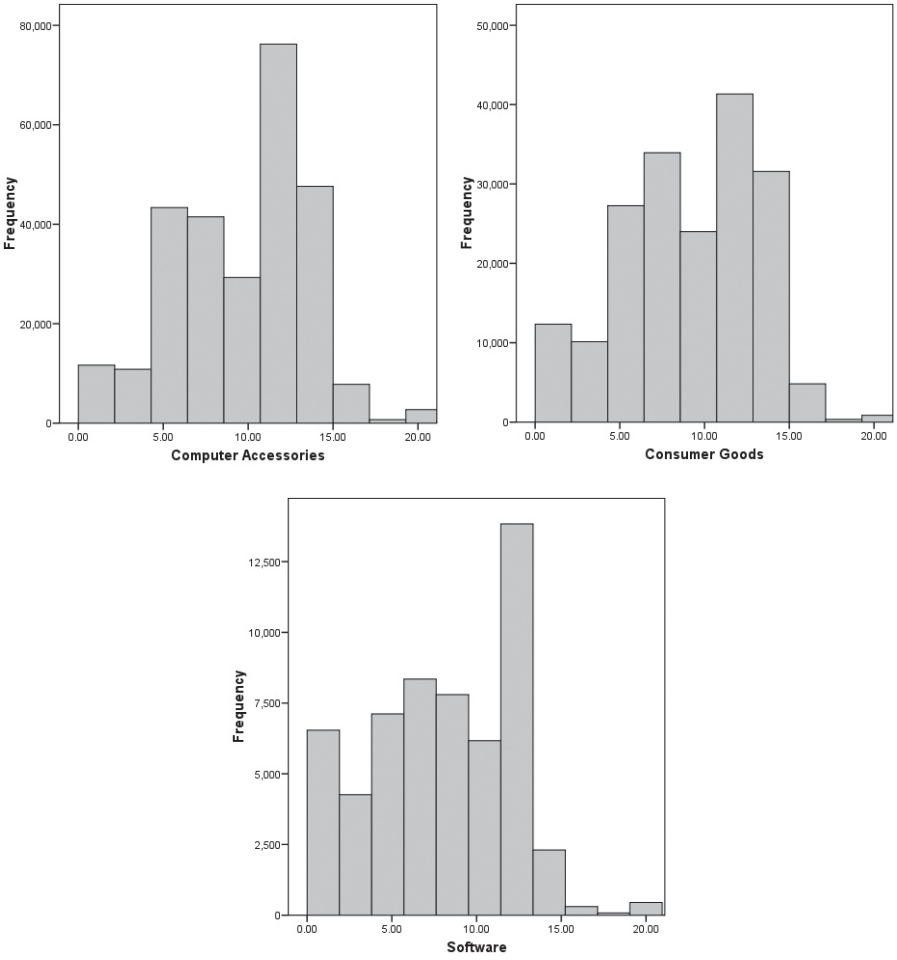

Figure 3. Distribution of Shipping Costs Across Product Categories

Notes: Computer accessories: mean = 9.6978, standard deviation = 4.39861, n = 272,729; Consumer goods: mean = 9.1406, standard deviation = 4.37316, n = 187,103; Software: mean = 7.8186, standard deviation = 4.40306, n = 57,216.

the average shipping costs are only about €9. Figure 3 also suggests that free shipping is used tactically as the number of observations deviates from any common distributional pattern.

Model Development

We test our hypotheses by considering each product category separately and all product categories jointly ("pooled data set"), given that Figure 3 shows differences in the distribution of shipping costs across product categories. To capture product-specific variations, we use fixed-effects regressions, which

account for unobserved heterogeneity across products. The significance of the Hausman test statistic supports the use of a fixed-effects model. The fixed effects that are specific for each product j in each category k are captured by the vector $v_{j,k}$.

To test our hypotheses, we examine the effects of free shipping and (nonzero) shipping costs on the net product price. We observe the shipping costs $SC_{i,j,k}$ for each offer i and for each product j in each category k. To distinguish between the effects of free shipping and shipping costs, we introduce a dummy variable $DV\_SC_{i,j,k}$ for each offer i for each product j in each category k, which equals 1 if the offer features free shipping, and 0 otherwise. We then introduce two terms in our fixed-effects model: $\alpha_{1j,k} \cdot DV\_SC_{i,j,k}$, which captures the effect of free shipping on the net product price, and $\alpha_{2j,k} \cdot (1 - DV\_SC_{i,j,k}) \cdot SC_{i,j,k}$, which captures the linear effect of (nonzero) shipping costs on the net product price.

We also control for the intensity of competition for each offer i and for each product j in each category k. To do so, we introduce the variable "hot item" $HI_{i,j,k}$. If a retailer has a product in stock, $HI_{i,j,k}$ is defined as the number of listings for j divided by the number of in-stock situations for j. So if the number of listings on the price comparison site is high and every retailer has it in stock, this variable equals 1. If the number of listings is high but only one retailer has the product j in stock, then the value of the variable hot item for offer i is very high. If the retailer does not have j in stock, $HI_{i,j,k}$ equals 0.

In addition, we incorporate the interplay between retailer's rating $RR_{i,j,k}$ for offer i for product j in category k and the net product price $NPP_{i,j,k}$ as outlined previously. To take the number of evaluations into account, we introduce the dummy variable "credible retailer" $DV\_C_{Ri,j,k}$, which is 1 when the number of evaluations is higher than the average number of evaluations in the pooled data set (overall average is six evaluations); otherwise it is 0.

$$\begin{aligned} NPP_{i,j,k} = {} & v_{j,k} + \alpha_{1j,k} \cdot DV\_SC_{i,j,k} + \alpha_{2j,k} \cdot \left(1 - DV\_SC_{i,j,k}\right) \cdot SC_{i,j,k} \\ & + \alpha_{3j,k} \cdot RR_{i,j,k} + \alpha_{4j,k} \cdot HI_{i,j,k} + \alpha_{5j,k} \cdot DV\_CR_{i,j,k} + \varepsilon_{i,j,k}. \end{aligned} \tag{1}$$

Endogeneity requires that we also estimate the impact of net product price $NPP_{i,j,k}$ on retailer's rating $RR_{i,j,k}$. In addition, the rating is influenced by the delivery time $DT_{i,j,k}$ and in-stock situations $DV\_IS_{i,j,k} \cdot DV\_IS_{i,j,k}$ is a dummy variable, which is 1 if the product can be delivered within the next 24 hours (i.e., is in stock) and 0 if the product has to be replenished (i.e., is out of stock).

$$RR_{i,j,k} = v_{j,k} + \alpha_{1j,k} \cdot NPP_{i,j,k} + \alpha_{2j,k} \cdot DT_{i,j,k} + \alpha_{3j,k} \cdot DV\_IS_{i,j,k} + \varepsilon_{i,j,k}. \tag{2}$$

Since some of the right-hand-side covariates are endogenous ($RR_{i,j,k}$ for Equation (1) and $NPP_{i,j,k}$ for Equation (2)), we estimate the models using two-stage least squares (2SLS) with instrumental variables and fixed effects.

We use a second model to determine the relation between gross product price and shipping costs by regressing the influence of shipping costs $(1 - DV\_SC_{i,j,k}) \cdot SC_{i,j,k}$, its quadratic term $(1 - DV\_SC_{i,j,k}) \cdot SC_{i,j,k}^2$, retailer's rating $RR_{i,j,k}$, the hot item variable $HI_{i,j,k}$, and the dummy variable $DV\_CR_{i,j,k}$ for credible retailers on the gross product price. We expect negative values for $\alpha_{1j,k}$

and positive values for $\alpha_{2j,k}$. If the parameters are significant, we can determine the shipping costs that will lead to the lowest gross price by setting the first derivative of Equation (3) to zero:

$$GPP_{i,j,k} = v_{j,k} + \alpha_{1j,k} \cdot DV\_SC_{i,j,k} + \alpha_{2j,k} \cdot \left(1 - DV\_SC_{i,j,k}\right) \cdot SC_{i,j,k} + \alpha_{3j,k} \cdot RR_{i,j,k} + \alpha_{4j,k} \cdot HI_{i,j,k} + \alpha_{5j,k} \cdot DV\_CR_{i,j,k} + \varepsilon_{i,j,k} \quad (3)$$

with

$$RR_{i,j,k} = v_{j,k} + \alpha_{1j,k} \cdot GPP_{i,j,k} + \alpha 2_{j,k} \cdot DT_{i,j,k} + \alpha_{3j,k} \cdot DV\_IS_{i,j,k} + \varepsilon_{i,j,k}. \quad (4)$$

Again we estimate a 2SLS model with instrument variables and fixed effects. We also test for multicollinearity by checking the correlations and the variance inflation factor (VIF) statistic. We find no evidence of multicollinearity problems (VIF statistic always lower than 1.3) in our data.

Results

Table 1 depicts the results for the different models and illustrates that the net product price decreases by less than €1 for every €1 increase in shipping costs in each category and for the entire data set; hence, the increase in shipping costs is not compensated for by a decrease in net product price. The estimated coefficient of shipping costs is significantly different from –1 (one-sided *t*-test, see [24]), which supports H1: An increase in shipping costs of €1 will lower the net product price on average by only €0.29. The existence of this effect is quite consistent over the different categories, although we observe an insignificant negative effect in the category "software."

Around 94 percent of retailers use partitioned prices, that is, they split up the gross product price into a net product price and shipping costs. Of these retailers, 53.2 percent charge rather high shipping costs (higher than the average shipping cost, excluding free shipping, of €9.87).

On the other side, we see a significant effect of free shipping on the net product price. If retailers offer free shipping, they charge on average a €4.65 higher net product price compared to a retailer with shipping costs of €1. A free shipping offer increases the gross product price by €5.36, whereas a €1 increase in shipping costs lowers the net product price by only €0.29 and thus increases the gross product price by €0.71. The difference in terms of gross product price between free shipping offers and offers with a €1 shipping cost is thus €4.65 (€5.36 – €0.71). This result supports H2, which is based on the idea that some groups of consumers are attracted by free shipping offers, wrongly assuming that these free shipping offers are attractive although they are more expensive than the ones with moderate shipping costs. The effect can be observed most clearly in the categories computer accessories and software. By comparing the different categories, we observe that retailers pursue the free shipping strategy in the categories computer accessories and software and pursue the partitioned prices strategy predominantly in the consumer

Table 1. Influence of Shipping Costs, Retailer Reputation, and "Hot Item" on Net Product Price.

	Free shipping ($DV\_SC_{i,j,k}$)	Shipping costs $(1 - DV\_SC_{i,j,k}) \cdot SC_{i,j,k}$	Retailer rating $RR_{i,j,k}$	Credible retailer $DV\_CR_{i,j,k}$	Hot item $HI_{i,j,k}$	Number of offers	*F*-value
Computer accessories	7.601***	-0.215***	0.448***	5.193***	-0.562***	272,729	1,018.19***
Consumer goods	1.651*	-0.452***	1.651**	4.261***	-0.632***	187,103	1,043.84***
Software	9.158***	-0.093$^{n.s.}$	-3.027$^{n.s.}$	2.047$^{n.s.}$	-0.932**	57,216	1,001.88***
All categories	5.362***	-0.288***	1.897***	6.622***	-0.741***	517,048	980.78***

***Significant at 0.01; **significant at 0.05; *significant at 0.1; n.s. = not significant.

goods category. When we analyze the entire data set, we find evidence for the exploitation of two different behavioral phenomena, namely, the biased perceptions of partitioned prices and the zero-risk bias. These results seem plausible: While computer accessories and software can be considered high involvement products, many consumer goods are ordered with little cognitive effort, and thus many customers in the category consumer goods tend to prefer the partitioned prices offers [13].

Regarding the control variables, Table 1 also illustrates that the retailer rating $RR_{i,j,k}$ has a positive influence on the net product price. This result means that high-quality retailers can charge a price premium, which is in line with previous literature [4]. For the entire data set, a retailer with a rating of 5 on the 5-star scale charges on average €1.90 more than a comparable retailer with a rating of 4.

Retailers with very few evaluations (less than 6) offer their product for a lower price (€6.62 on average for the entire data set) to gain entry into the market. Stated differently, well-established firms charge significantly higher prices ($p < 0.01$).

However, we do not observe that retailers increase prices for items that are sold out by competitors to extract the consumers' surplus. The net product price for these hot items is significantly lower than for common items. Most likely, retailers decrease the net product price in case of high competition, but do not monitor the delivery time of the competitors and thus do not make use of this information to raise the price.

Table 2 shows the influence of the net product price, the delivery time, and the in-stock dummy on retailer rating. As expected, we observe that lower net product prices, shorter delivery times, and increasing numbers of in-stock situations bolster the retailer rating ($p < 0.01$). The results in Tables 1 and 2 nicely illustrate the interplay between price and retailer rating. While a positive rating allows retailers to charge price premiums, lower net product prices lead to higher ratings.

For a further analysis, we tabulate ratings and exploitations of the two biases. We create three rating classes: unrated class (0 ratings), low rating class (rating < 4.5), and high rating class (rating ≥ 4.5) and assume that a retailer tries to exploit the consumers' biased perceptions when the shipping cost strategy leads to higher gross product prices than the average price for the particular product. Table 3 reveals the following: While exploitation of the zero-risk bias is as common in the low rating class as in the high rating class, there are differences between these two classes with respect to exploiting partitioned prices. The number of exploiting offers in the high rating class is significantly lower ($p < 0.01$) than in the low rating class. This result indicates that exploiting partitioned prices leads ultimately to more unsatisfied customers than exploiting the zero-risk bias. A reason might be that consumers recognize the high shipping costs just before submitting the order. Although they are upset by the higher shipping costs, they might not abandon the shopping basket due to their high lock-in costs. Yet they might rate the retailer poorly, whereas consumers who prefer free shipping offers know what they get and might be willing to pay the higher price as premium for the zero risk. This conclusion,

Table 2. Influence of In-Stock Products, Net Product Price, and Delivery Time on Retailer Rating.

	In-stock products $DV\_IS_{i,j,k}$	Net product price $NPP_{i,j,k}$	Delivery time $DT_{i,j,k}$	Number of offers	*F*-value
All categories	0.262***	-0.024***	-0.045***	517,048	1.66***

*** Significant at 0.01; ** significant at 0.05; *significant at 0.1; n.s. = not significant.

Table 3. Tabulation of Rating and Exploitation of Biases.

	Exploiting free offers	Exploiting partitioned prices
Unrated class	37.2%	35.5%
Low rating class	24.5%	35.9%
High rating class	24.0%	29.0%

however, requires more support from further research, which ideally will test the causality by experiments.

As a second result, Table 3 shows that significantly more free offers can be found in the unrated class. This result might be due to the fact that advertising free offers is used to gain entry into the market. With respect to exploiting partitioned prices, we see no significant difference between the unrated class and the low rating class.

Gross Product Prices of Free Shipping Offers

The strong influence of free shipping on the gross product price is illustrated in Figure 4. To match the increase in the gross product price through free shipping, shipping costs would have to be approximately €7.53.

To compare the effects of the different strategies on the gross product price, we introduce a quadratic term (see Equation (3)). Table 4 lists the results, and we conclude that for computer accessories, consumer goods, software, and the pooled data set, a U-shaped relationship emerges between shipping costs and gross product price. The curve starts at a high level where shipping costs are zero, declines to a minimum, then rises again with increasing shipping costs.

The estimation of the quadratic term in Table 4 (the inclusion of retailer ratings or standardized retailer ratings—each rating divided by the average of the ratings for all retailers that offer the same product—indicates that our results are robust) enables us to determine the minimum shipping costs for computer accessories, consumer goods, software, and all categories pooled;

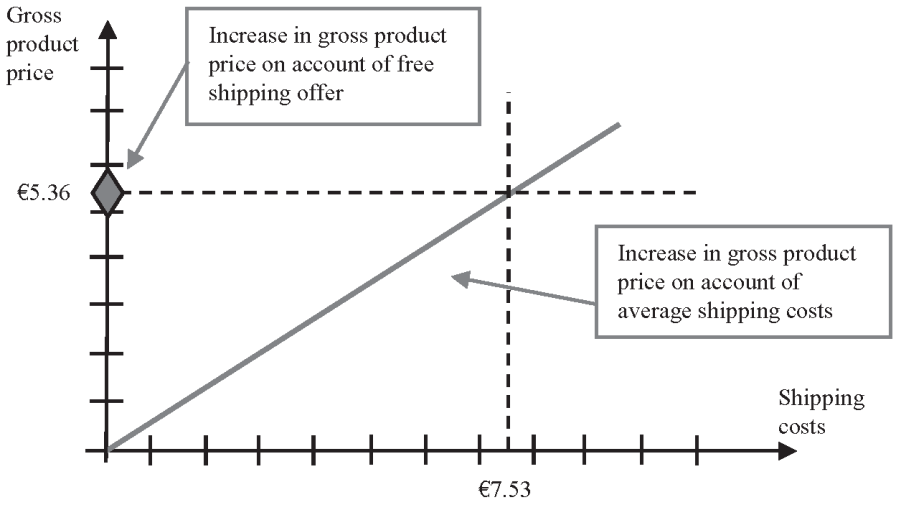

Figure 4. Effect of "Free Shipping" and Shipping Costs on Gross Product Price

thus, we can offer some advice to prospective buyers in these product categories. Specifically, the consumer makes the best deal when shipping costs are moderate. Table 5 presents the optimal shipping costs, which from a consumer perspective will lead to the minimum gross product price, in comparison to free shipping offers.

We also compare the gross prices of offers with free shipping and those with nonzero shipping fees. Figure 5 depicts the results for the different product categories; we also note the differences between these two types of shipping cost strategies. Free shipping leads to higher gross product prices than offers with average shipping costs in the categories computer accessories and software.

These results show that our data set provides evidence for the existence of a partitioned prices strategy as well as a free shipping strategy. According to Table 5, consumers are on average better off when they pay moderate shipping costs. We also find evidence for the prevalent pursuit of the free shipping strategy (which leads to higher net product prices) for computer accessories and software. In the consumer goods category, retailers more actively pursue the partitioned prices strategy by charging fairly high shipping costs and hence higher gross product prices. However, the magnitude of partitioned prices is even greater for the category computer accessories, where an increase of €1 in shipping costs results in a decrease of the net product price by only €0.22. This difference in shipping cost strategies might reflect the fact that more price competition exists in the computer accessories category (on average 69 offers per product compared to 48 offers on average in the other two categories). Consequently, retailers of these products would generally be more concerned with achieving attractive rankings on price comparison sites than retailers offering consumer goods.

Table 4. Linear and Quadratic Effects of Shipping Costs on Gross Product Price.

	Shipping costs $(1 - DV\_SC_{i,j,k}) \cdot SC_{i,j,k}$	Squared shipping costs $(1 - DV\_SC_{i,j,k}) \cdot SC_{i,j,k}^2$	Retailer rating $RR_{i,j,k}$	Credible retailer $DV\_CR_{i,j,k}$	Hot item $HI_{i,j,k}$	Number of offers	*F*-value
Computer accessories	-0.068$^{n.s.}$	0.028***	0.318***	4.976 **	-0.498***	272,729	998.14***
Consumer goods	-0.574***	0.048***	1.963***	4.399***	-0.605***	187,103	1,052.81***
Software	-2.283***	0.179***	-1.173$^{n.s.}$	1.747$^{n.s.}$	-0.941***	57,216	1,010.32***
All categories	-0.278***	0.037***	2.140***	7.005***	-0.700***	517,048	972.60***

***Significant at 0.01; **significant at 0.05; *significant at 0.1; n.s. = not significant.

Table 5. Shipping Costs Leading to the Lowest Gross Product Price.

Product category	Optimal shipping costs	Savings in gross product price *
Computer accessories	€1.21	0.04%
Consumer goods	€5.98	1.12%
Software	€6.38	39.74%
All categories	€3.76	0.77%

* Savings in gross product price (according to estimates in model with linear and quadratic effects) compared to free shipping offers.

Summary, Implications, and Limitations

Previous literature has identified two coexisting types of biases in consumer's perceptions regarding shipping costs, which can be exploited by price partitioning with rather high shipping costs and free shipping offers. We observe in our data set both shipping cost strategies: Some retailers use free shipping costs to exploit the zero-risk bias; other retailers use a partitioned pricing strategy to address another segment of consumers that are likely to have biased perceptions of partitioned prices.

Our study features several limitations, however, that may suggest avenues for further research. First, we observe retailers' behavior exclusively; we are unable to evaluate consumers' reactions to these strategies. One would expect that the retailers would behave optimally in the long run and thus that our observations provide, at best, second-order evidence for consumer behaviors. This, however, cannot be stated with certainty. Based on this limitation, we agree with Ratchford [39] that observing both sides of the market could provide very interesting insights, for example, with additional transactional data. Our analyses cannot resolve which strategy yields the better results and which consumer segments react to one or another bias. Such disentanglement can ultimately only be performed empirically, thus providing an exciting research opportunity for new experiments in the area of consumer behavior.

Second, our sample consists only of retailers listed on a particular price comparison site. Therefore, the sample may be biased to a certain degree, as literature on price comparison sites reveals that some retailers strategically avoid these sites (e.g., [1, 28]). However, the pressure on retailers to be listed on price comparison sites is high enough that we expect a rather low potential sample selection bias. Similar results based on data from a second price comparison site confirmed our findings and indicate the robustness of our results.

Third, the European market differs from the U.S. market with respect to return policies used for online shopping. While return shipping costs and even restocking fees are common practice in the United States, such charges are illegal in many European countries. Therefore, the generalizability of our results to all countries may be limited.

Another interesting avenue for further research is the area of payment costs. Besides shipping costs, the differentiation by payment costs seems to

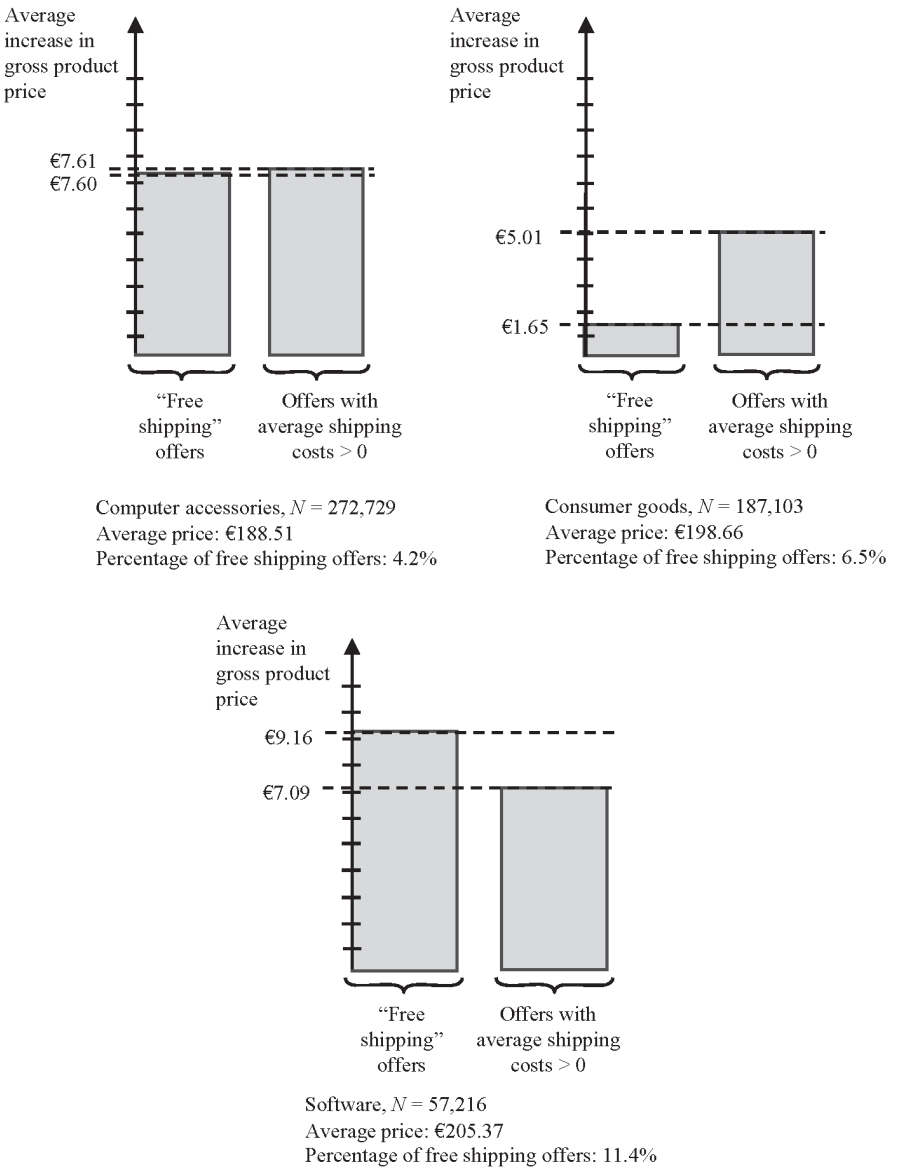

Figure 5. Average Increase in Gross Product Price for Offers with Average Shipping Costs Versus "Free Shipping" Offers (Across Product Categories)

be another promising strategy for exploiting consumers' biased perception of partitioned prices. The focal price comparison site of this study bases its comparison on the cheapest payment option, but competing price comparison sites like www.geizkragen.de and www.idealo.de present more detailed and differentiated payment costs (e.g., for credit cards).

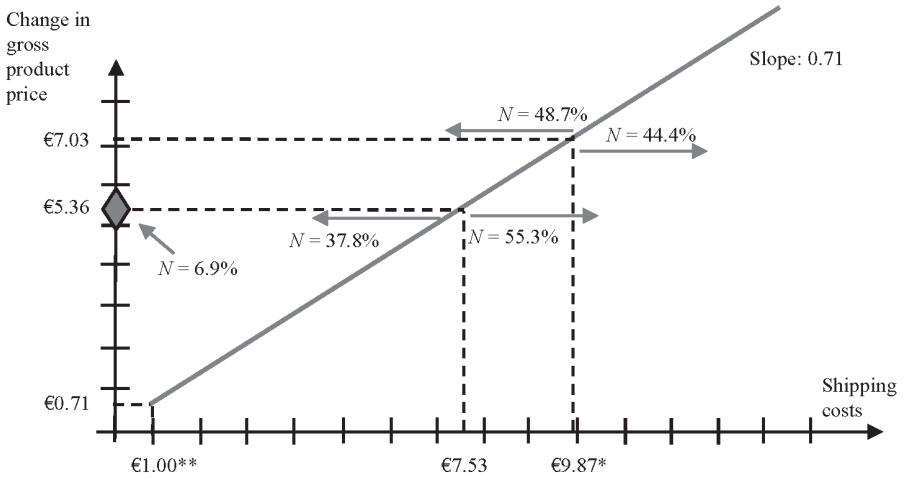

Figure 6. Share of Retailers Using Different Shipping Cost Strategies and Their Effects on Changes in Gross Product Price

* Average shipping costs, excluding free shipping offers; ** minimum shipping costs.

Figure 6 summarizes our specific findings. About 7 percent of all retailers in our study pursue a free shipping strategy. They charge zero shipping costs but charge a rather high net product price, which leads to a gross product price that is €4.65 higher than the retailers that charge the lowest shipping costs of €1. The former group of retailers benefit from consumers' biased perception of free shipping costs, which is consistent with previous findings from experimental work by Shampanier, Mazar, and Ariely [42].

Our results reveal also another group of retailers charging shipping costs higher than the average of €9.87. These increases in shipping costs lead to only disproportionally smaller decreases in net product prices, so that gross product prices increase on average by €0.71 for every €1 increase in shipping costs. As the increase in shipping costs is not compensated by a decrease in net product price, we deduce that these retailers are using the strategy of partitioned pricing to generate more profit. Retailers can find two advantages in this strategy. First, the lower net price might lead to more attractive rankings on price comparison sites if products are ranked according to their net product price. Second, consumers have biased perceptions of partitioned prices: Combinations of net product prices and shipping costs that lead to similar gross product prices are often perceived as being different. This finding parallels that of Morwitz, Greenleaf, and Johnson [36], who showed that partitioned prices lead to differences in recalled gross product prices for comparable combinations of net product prices and shipping costs.

Consumers can learn from these results, particularly that offers with low but nonzero shipping fees should ultimately result in the lowest gross product price. Both shipping cost strategies—namely, offers with free shipping and those with high shipping fees—lead to substantially higher gross product prices. From a retailer's perspective, both strategies seem to be promising. Our

results indicate that categories with low-involvement products like consumer goods might be better suited for the use of partitioned prices, as consumers expend little cognitive effort on comparing prices. For risky products, free shipping offers seem to be more promising. However, both strategies can be observed at the same time since they address different segments in the market. Very preliminary results indicate that exploiting the zero-risk bias does not come with consumer backlash in the form of low ratings. This conclusion, however, requires further support from additional experimental studies to better identify the causality.

Exploiting shipping costs is not limited to online retail storefronts, but also appears on platforms such as eBay. Our results suggest that sellers on eBay also have exploited buyers' biased perceptions of partitioned prices. This exploitation led to numerous complaints in the past, which resulted in eBay's finally changing the shipping cost policy: The company now sets limits on shipping and handling charges for selected categories (for more details, see http://pages.ebay.com/sell/august2008update/maxshipping/). We suspect that auction data might also support our analyses and also provide first-order evidence of biased consumer perceptions in real markets.

REFERENCES

1. Alba, J.; Lynch, J.; Weitz, B.; Janiszewski, C.; Lutz, R.; Sawyer, A.; and Wood, S. Interactive home shopping: Consumer, retailer, and manufacturer incentives to participate in electronic marketplaces. *Journal of Marketing, 61,* 3 (1997), 38–53.

2. Ancarani, F., and Shankar, V. Price levels and price dispersion within and across multiple retailer types: Further evidence and extension. *Journal of the Academy of Marketing Science, 32,* 2 (2004), 176–187.

3. Ariely, D. *Predictably Irrational: The Hidden Forces That Shape Our Decisions.* New York: HarperCollins, 2008.

4. Ba, S., and Pavlou, P.A. Evidence of the effect of trust building technology in electronic markets: Price premiums and buyer behavior. *MIS Quarterly, 26,* 3 (2002), 243–268.

5. Bakos, Y. Reducing buyer search costs: Implications for electronic marketplaces. *Management Science, 43,* 12 (1997), 1676–1692.

6. Barrot, C.; Albers, S.; Skiera, B.; and Schäfers, B. Vickrey vs. eBay: Why second-price sealed-bid auctions lead to more realistic price-demand functions. *International Journal of Electronic Commerce, 14,* 4 (Summer 2010), 7–38.

7. Baye, M.R.; Gatti, R.J.; Kattuman, P.; and Morgan, J. Clicks, discontinuities, and firm demand online. *Journal of Economics & Management Strategy, 18,* 4 (2009), 935–975.

8. Bayles, D.L. *E-Commerce Logistics and Fulfillment: Delivering the Goods.* Upper Saddle River, NJ: Prentice Hall, 2001.

9. Baylis, K., and Perloff, J.M. Price dispersion on the internet: Good firms and bad firms. *Review of Industrial Organization, 21,* 3 (2002), 305–324.

10. Bertin, M., and Wathieu, L. Attention arousal through price partitioning. *Marketing Science, 27,* 2 (2008), 236–246.

11. Brown, J.R., and Goolsbee, A. Does the Internet make markets more competitive? Evidence from the life insurance industry. *Journal of Political Economy, 110,* 3 (2002), 481–507.
12. Brynjolfsson, E., and Smith, M.D. Frictionless commerce? A comparison of Internet and conventional retailers. *Management Science, 46,* 4 (2000), 563–585.
13. Burman, B., and Biswas, A. Partitioned pricing: Can we always divide and prosper? *Journal of Retailing, 83,* 4 (2007), 423–436.
14. Busse, M., and Rysman, M. Competition and price discrimination in yellow pages advertising. *RAND Journal of Economics, 36,* 2 (2005), 378–390.
15. Clay, K.; Krishnan, R.; Wolff, E.; and Fernandes, D. Retail strategies on the Web: Price and non-price competition in the online book industry. *Journal of Industrial Economics, 50,* 3 (2002), 351–367.
16. Dewan, R.; Freimer, M.; and Jiang, Y. A temporary monopolist: Taking advantage of information transparency on the Web. *Journal of Management Information Systems, 24,* 2 (Fall 2007), 167–194.
17. Dewan, R.; Jing, B.; and Seidmann, A. Adoption of Internet-based product customization and pricing strategies. *Journal of Management Information Systems, 17,* 2 (Fall 2000), 9–28.
18. Daripa, A., and Kapur, S. Pricing on the Internet. *Oxford Review of Economic Policy*, *17,* 2 (2001), 202–216.
19. Dinlersoz, E.M., and Li, H. The shipping strategies of Internet retailers: Evidence from Internet book retailing. *Quantitative Marketing and Economics,* 4, 4 (2006), 407–438.
20. EuPD Research. eCommerce 2006. Bonn, June 2006 (available at www.scribd.com/doc/136622/eCommerce2006/).
21. Finucane, M.L.; Alhakami, A.; Slovic, P.; and Johnson, S.M. The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making, 13,* 1 (2000), 1–17.
22. Fitzsimons, G.J. Consumer response to stockouts. *Journal of Consumer Research, 27,* 2 (2000), 249–266.
23. Gourville, J.T., and Soman, D. Overchoice and assortment type: When and why variety backfires. *Marketing Science, 24,* 3 (2005), 382–395.
24. Greene, W.H. *Econometric Analysis,* 6th ed. Upper Saddle River, NJ: Prentice Hall, 2008.
25. Hamilton, R.W., and Srivastava, J. When 2 + 2 is not the same as 1 + 3: Variations in price sensitivity across components of partitioned prices. *Journal of Marketing Research, 45,* 4 (2008), 450–461.
26. Hinz, O., and Spann, M. The impact of information diffusion on bidding behavior in secret reserve price auctions. *Information Systems Research, 19,* 3 (2008), 351–368.
27. Hinz, O.; Hann I.-H.; and Spann, M. Price discrimination in e-commerce? An examination of dynamic pricing in name-your-own-price markets. *MIS Quarterly*, *35,* 1 (2011), 81–98.
28. Iyer, G., and Pazgal, A. Internet shopping agents: Virtual co-location and competition. *Marketing Science, 22,* 1 (2003), 85–106.
29. Johnson, E.J.; Moe, W.W.; Fader, P.S.; Bellman, S.; and Lohse, G.L. On the depth and dynamics of online search behavior. *Management Science, 50,* 3 (2004), 299–308.

30. Johnson, M.D.; Herrmann, A.; and Bauer, H. The effects of price bundling on consumer evaluations of product offerings. *International Journal of Research in Marketing, 16,* 2 (1999), 129–142.
31. Kannan, P.K., and Kopalle, P.K. Dynamic pricing on the Internet: Importance and implications for consumer behavior. *International Journal of Electronic Commerce, 5,* 3 (Spring 2001), 63–83.
32. Keeney, R.L. The value of Internet commerce to the customer. *Management Science, 45,* 4 (1999), 533–542.
33. Lambrecht, A., and Skiera, B. Paying too much and being happy about it: Existence, causes and consequences of tariff-choice biases. *Journal of Marketing Research, 43,* 2 (2006), 212–222.
34. Lewis, M.; Singh, V.; and Fay, S. An empirical study of the impact of nonlinear shipping and handling fees on purchase incidence and expenditure decision. *Marketing Science, 25,* 1 (2006), 51–64.
35. Mahadevan, B. Business models for Internet-based e-commerce: An anatomy. *California Management Review, 42,* 4 (2000), 55–69.
36. Morwitz, V.G.; Greenleaf, E.A.; and Johnson, E.J. Divide and prosper: Consumers' reactions to partitioned prices. *Journal of Marketing Research, 35,* 4 (1998), 453–463.
37. Oliver, R.L. A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research, 17,* 4 (1980), 460–469.
38. Pan, X.; Ratchford, B.T.; and Shankar, V. Price dispersion on the Internet: A review and directions for future research. *Journal of Interactive Marketing, 18,* 4 (2004), 116–135.
39. Ratchford, B.T. Online pricing: Review and direction for research. *Journal of Interactive Marketing, 23,* 1 (2009), 82–90.
40. Schindler, R.M.; Morrin, M.; and Bechwati, N.N. Shipping charges and shipping-charge skepticism: Implications for direct marketers' pricing formats. *Journal of Interactive Marketing, 19,* 1 (2005), 41–53.
41. Scholten, P., and Smith, S.A. Price dispersion then and now: Evidence from retail and e-tail markets. In M.R. Baye (ed.), *Advances in Applied Microeconomics: Volume 11—The Economics of the Internet and E-Commerce.* Bingley, UK: Emerald Group, 2002, pp. 63–88.
42. Shampanier, K.; Mazar, N.; and Ariely, D. Zero as a special price: The true value of free products. *Marketing Science, 26,* 6 (2007), 742–757.
43. Shapiro, C. Premiums for high quality products as returns to reputations. *Quarterly Journal of Economics, 98,* 4 (1983), 659–679.
44. Slovic, P.; Finucane, M.L.; Peters, E.; and MacGregor, D.G. The affect heuristic. In T. Gilovich (ed.), *Heuristics and Biases: The Psychology of Intuitive Judgment.* New York: Cambridge University Press, 2002, pp. 397–420.
45. Smith, M.D. The impact of shopbots on electronic markets. *Journal of the Academy of Marketing Science, 30,* 4 (2002), 446–454.
46. Spann, M., and Tellis, G.J. Does the Internet promote better consumer decisions? The case of name-your-own-price auctions. *Journal of Marketing, 70,* 1 (2006), 65–78.
47. Spann, M.; Skiera, B.; and Schäfers, B. Measuring individual frictional costs and willingness-to-pay via name-your-own-price mechanisms. *Journal of Interactive Marketing, 18,* 4 (2004), 22–36.

48. Tversky, A., and Kahneman, D. Judgment under uncertainty: Heuristics and biases. *Science, 185,* 4157 (September 1974), 1124–1131.
49. Varian, H.R. A model of sales. *American Economic Review, 70,* 4 (1980), 651–659.
50. Xia, L., and Monroe, K.B. Price partitioning on the Internet. *Journal of Interactive Marketing, 18,* 4 (2004), 63–73.
51. Zettelmeyer, F.; Morton, S.; and Silva-Risso, J. How the Internet lowers prices: Evidence from matched survey and automobile transaction data. *Journal of Marketing Research, 43,* 2 (2006), 168–181.

TANJA FRISCHMANN (frischmann@wiwi.uni-frankfurt.de) is a consultant at a multimedia agency in Frankfurt, Germany. Her research interests are in the area of e-commerce, Web marketing, customer value management, and conversion of customers. Prior to this, she was a research assistant at the Chair of Electronic Commerce in the project E-Finance Lab. She received her Ph.D. from the Faculty of Business and Economics at Goethe University of Frankfurt, Germany.

OLIVER HINZ (hinz@wi.tu-darmstadt.de) is a chaired professor of information systems, especially electronic markets, at TU Darmstadt (Germany). In addition to electronic markets, his interests include diffusion and social contagion processes, interactive pricing, and social media. Hinz worked for several years as a consultant for business logic in the financial services industry prior to his academic career. He received his Ph.D. from Goethe University of Frankfurt (Germany) in 2007. His dissertation was awarded various prizes, including the Schmalenbach prize for young researchers in 2008. His research has been published or is forthcoming in journals such as *Information Systems Research, Journal of Management Information Systems, MIS Quarterly, Journal of Marketing, International Journal of Electronic Commerce,* and *Decision Support Systems.*

BERND SKIERA (skiera@wiwi.uni-frankfurt.de) is a chaired professor of electronic commerce at the Faculty of Business and Economics at Goethe University, Frankfurt, Germany, and a member of the board of the E-Finance Lab at the House of Finance at the University of Frankfurt. Before his academic career, he worked as a software developer for SAP. His research areas are online marketing, customer management, and pricing. He was a finalist for the *Journal of Marketing*'s 2008 MSI/H. Paul Root Award and received twice the yearly award for the best paper by German professors of business administration. His work has been published in, among other journals, the *Journal of Marketing, Journal of Management Information Systems, Journal of Marketing Research, Management Science, Marketing Science, International Journal of Electronic Commerce, Journal of Product Innovation Management, Journal of Service Research,* and *European Journal of Operational Research.*